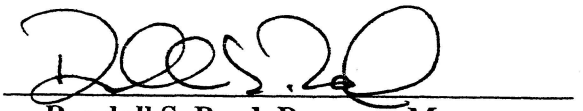
QUARTERLY PROGRESS REPORT
DRD 875MA-003
July [redacted] September 2001

Marshall Space Flight Center
Safety and Mission Assurance Mission Services Contract
NAS8-00179

Approved:



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MSFC S&MA Mission Services

October 12, 2001

Hernandez Engineering, Inc.
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1.0 INTRODUCTION

Hernandez Engineering, Inc. (HEI) successfully performed all required activities and tasks, as described in this report, in fulfillment of their Safety and Mission Assurance (S&MA) Mission Services Contract (NAS8-00179) with NASA's Marshall Space Flight Center (MSFC). This report covers a three-month period of the contract's fourth quarter of the first year: July 2001 through September 2001.

2.0 GENERAL MANAGEMENT

2.1 Data Requirements

The fourth quarter of the S&MA Mission Services contract was successfully completed on September 30, 2001. All Data Requirements (DR) Documents were submitted on or ahead of schedule throughout the quarter. They included DRD 875CD-001 On-Site Employee Location Listing; DRD 875MA-002 Financial Management Reports; DRD 875MA-003 Progress Reports (Monthly/Quarterly); DRD 875MA-006 Operations Plan, Problem Assessment Center (PAC); RD 875MA-007 Quarterly Open Problems List; DRD 875MA-008 Monthly Newly Opened/Closed Problem Summary; DRD 875SA-002 Mishap and Safety Statistics Reports.

2.2 Personnel Status

(b)(4)

3.0 BUSINESS MANAGEMENT

We have experienced no financial or business management problems during this period. We attribute this to close attention to details, effective use of established controls designed to efficiently respond to program changes---both anticipated and unexpected---and the continuing support of our corporate financial group's dedicated efforts at controlling overhead expenses.

The contract continues to have a total cost underrun at the end of this period---see the September 2001 Monthly Financial Report, DRD 875MA-002, for specifics. Attachment 2, Man-Hours Expended, of this report contains a description, by major task, of the total man-hours expended this period.

(b)(4)

4.0 PERFORMANCE OF WORK AND USE OF FACILITIES AND EQUIPMENT

4.1 Safety

4.1.1 Industrial Safety (IS)

The Industrial Safety (IS) group performed 162 OSHA compliance facility inspections and provided all required reports in a timely manner, meeting the schedule approved by QS30. IS also performed 488 construction site compliance inspections to monitor adherence to OSHA and MSFC safety standards. All facility safety violations were documented in the HAZTRAK databases in order to assure MSFC's compliance with OSHA, NASA, and other consensus code requirements.

Among other activities, IS: (1) updated two facility fire evacuation plans; (2) participated in three pre-construction conferences; (3) performed ten final safety inspections of facilities under renovation or construction; (4) reviewed 121 sets of facility design drawings for compliance with OSHA and consensus codes; and, (5) performed three fire drills. Our OSHA compliance inspectors participated in the annual

Alabama Governor's Safety Conference and participated in numerous training sessions, essential to maintain proficiency in performing OSHA facilities and constructions inspections.

In support of the MSFC initiative to become VPP Star Certified, IS continued to provide a (b)(4) to assist the VPP Communications and Implementation Teams, and general communication of safety awareness to all MSFC employees. (b)(4) provides direct support to QS01 and assists the VPP Implementation Team. (b)(4) (b)(4) have an active role in readying MSFC for the VPP OSHA audit and Star certification. Assistance included: (1) writing an initial VPP article for publication in the Marshall Star and several associated articles; (2) assisting the VPP Training Subcommittee by drafting an operating plan; (3) preparing a listing of revised Star eligibility requirements to serve as a basis for planning employee training; (4) assisting QS01 prepare the SHE Training Committee VPP presentation given to the VPP Steering Committee; (5) preparing an initial outline of the VPP Publicity Campaign; and, (6) assisting S&MA prepare a self evaluation check sheet, "What Managers/Supervisors Must Do" for the Voluntary Protection Program (VPP) Star Certification efforts. This document will be on the Inside Marshall Web for the Managers and Supervisors to self assess their readiness in preparation for the OSHA VPP Audit.

As a major significant effort, IS continued to provide extensive support to the planning and review activities associated with the planned new Propulsion Research Laboratory (PRL). Support included: (1) participation in the weekly meetings; (2) performing numerous safety assessments and facility inspections of current hazardous operations scheduled to be relocated in the PRL; and, (3) performing an extensive safety review of the Jacobs Engineering/Sverdrup 30% Design package. When this review is completed, over 700 drawings and over 400 pages of written documentation will have been reviewed.

IS initiated, completed, or followed up on more than a dozen facility safety assessments. Examples included: (1) the safety assessment (SA) for the 24" SRTM Motor test conducted at Test Stand 500. The SA was performed in coordination with the test engineer and the QS30 Safety Engineer, and included multiple site visits to review the test setup. The SA contained Quantity-Distance (QD) requirements for the installation and build up of the motor and for testing the actual motor firing; (2) an Operational Hazard Analysis (OHA) on the 24 Inch Motor Lifting Operation performed at Test Stand 500. The OHA identified 14 potential hazards from viewing the lift location and a review of the operating procedures. The lift was performed without incident; (3) the SA for the X-34 LOX Tank test which included assistance to assure adequate closures to safety hazard/concerns identified in the SA. Once the closures were approved by S&MA, IS documented them in the SA and assisted in obtaining approval signatures prior to testing. The LOX Tank was filled with LOX and successfully tested at the pressures set for conducting this series of test at Test Stand 500; and (4) as a special task, IS assisted the National Space Science Technology Center (NSSTC) in the new off-site facility by reviewing the draft NSSTC Safety and Health Plan. IS suggested that NSSTC simplify the plan by referencing existing MSFC Safety and Health policies and procedures, adding special requirements unique to their off-site location. Upon receipt of existing operating procedures for hazardous operations, IS will assist users verify procedures to help assure the safety of the all NSSTC occupants and perform facility baseline safety assessments as required.

As a significant strength, IS continued to provide dedicated, full-time safety and quality support to the MSFC Test areas. Support included: (1) the pre-test and post-test activities for the 24" SRTM; (2) review of the proposed upgrades to the spray booth in building 4707; (3) review of the proposed testing of the GH2 and GOX; and, (4) performed numerous test procedure reviews.

IS continued to support the implementation of the NASA lifting standard, NSS 1740.9 by providing day-to-day advice and assistance to S&MA customers. In addition to performing several Operating Hazard Analyses (OHAs), IS served as the safety monitor for the dual crane critical load lift and convoy from building 4755 to building 4708 of the ISS S5 Truss Structural Test Article (STA). The lift utilized

Boeing and MSFC equipment. The OHA for the dual crane critical lift, movement, and handling was completed by Boeing safety and served as the on-site safety guidance at MSFC. Also, IS administered hands-on proficiency examinations to twelve aerial lift operators, seven overhead-crane/hoist operators and four forklift operators in support of the MSFC Personnel Certification Program.

4.1.2 System Safety Engineering (SSE)

System Safety reviewed and provided comments to the Hazard Assessments for High Pressure Oxidizer Turbopump/Alternant Turbopump (HPOTP/AT) and United Space Alliance (USA) Solid Rocket Booster (SRB) element. In addition, System Safety reviewed and provided comments for the Reusable Solid Rocket Motor (RSRM) left hand booster field joint repair and the USA Hardware Reuse Plan. System Safety continued supporting the Friction-Stir Weld (FSW), B218 Weld Wire, and AFT Ogive/thrust panel Critical Design Reviews (CDRs) by reviewing the S&MA and verification sections of the respective Design Review Volumes.

System Safety provided technical support for the following: Shuttle Safety Review Panels, STS 104 Delta Flight Readiness Review (FRR) tagup Preflight Assessment Review (PAR), RSRM STS 105 Project Milestone Pre FRR, and STS 105 Preflight Assessment (PFA). System Safety provided technical support during STS-105 for the External Tank (ET) Huntsville Operation Support Center (HOSC) console. In addition, a safety assessment for STS-105 was provided. System Safety also supported an offsite weeklong meeting with the RSRM team.

System Safety continues to evaluate Unsatisfactory Condition Report (UCRs), and Problem Reports (PRs), as required to support the shuttle program, as well as reviewing changes for impacts to safety.

4.1.3 Payload Safety

Payload Safety completed/updated ten safety data packages (SDPs). The Glovebox Integrated Microgravity Isolation Technology (g-LIMIT) Flight Phase III, Multipurpose Logistics Module (MPLM)/Orbiter Reflight, Microgravity Science Glovebox (MSG) Integrated Flight Phase III, and Material Science Research Rack (MSRR-1) Integrated Flight Phase III SDPs were submitted to Johnson Space Center (JSC). The g-LIMIT Phase III, and Single-Locker Thermal Enclosure System (STES) UF-1 Reflight Ground Safety Data Packages (GSDPs) were submitted to Kennedy Space Center (KSC). In addition, Preliminary Hazard Analysis (PHA) was completed for Self-Diffusion in Liquid Elements (SDLE). Payload Safety initiated Flight SDPs for g-LIMIT Phase III and Pore Formation and Mobility Investigation/Solidification Using a Baffle in a Sealed Ampoule (PFMI/SUBSA) Phase III. Ground SDPs for MSG Integrated Phase III, Node 2 Delta Phase II, and PFMI/SUBSA Phase III were also initiated. In addition to SDP development, Payload Safety continued development of eight SDPs and reviewed/submitted comments for seven SDPs.

Payload Safety supported the Flight Safety Review Panel (SRP) for Node 2 Delta Phase II, MSG Facility Phase III, Delta-L Phase II, and MSRR-1 Integrated Phase III. Payload Safety presented the Node 2 Delta Phase II to the flight SRP where 7/9 hazard reports were approved with modification. Additionally, the MSRR-1 Integrated Phase III was presented to the SRP and 4/4 hazard reports were approved with modification (out of board). A special topic SRP was conducted for Node 3 Environmental Control Life Support Systems (ECLSS). Payload Safety supported the Node 3 Oxygen Generation Assembly (OGA) redesign and the Delta-L reviews by Marshall Payload Safety Readiness Review Board (MPSRRB). Payload Safety continues completion of the Propulsive Small Expendable Deployers Systems (ProSEDS) Missile System Prelaunch Safety Package (MSPSP). Payload Safety reviewed Air Force Space Command Manual (AFSPC MAN 91-70-1) for changes of Range Safety requirements (EWR 127-1).

System Safety participated in the following technical meetings: Delta-L Critical Design Review (CDR), Node 3 Ground Working Group, Dynamically Controlled Protein Crystal Growth (DCPCG) Flight Readiness Review (FRR), Solar B Extreme ultraviolet Imaging Spectrometer (EIS) CDR, Nodes Vehicle

Control Board (VCB), Deorbit Propulsion System (DPS) Probabilistic Risk Assessment (PRA), SDLE Requirements Design Review (RDR) dry run, and the OGA O2/H2 Hazard Analysis at White Sands Test Facility (WSTF). In addition, System Safety provided support to the Contractor Support Console at JSC during the Flight 7A mission. Payload Safety reviewed and provided comments to the Integrated System Test of an Air Breathing Rocket (ISTAR) S&MA Plan.

4.2 Reliability

4.2.1 Reliability & Maintainability (R&M) Engineering

In support of Shuttle Projects, significant R&M activities included participation in the launch support activities for STS-104 and STS-105 as well as active participation in anomaly resolution teams. R&M participated in the STS-104 SRB teardown inspection at KSC and prepared and presented to Level IV and Level III a summary of the updates of the FMEA/CIL, and HAR for the SRB Single Mission Fuel Isolation Valve (SMFIV) upgrade that made its initial flight on STS-105. R&M participated as a member of a joint NASA/Thiokol Kaizen team performing a process study and improvement on the processing of engineering changes for RSRM. As a result of this effort, a derivative of a HEI-developed change review system has been implemented for RSRM. Additionally, R&M developed a new evaluation process for reviewing Senior Material Review Board items that ensures deeper evaluations from the three HEI S&MA disciplines (Safety, Quality Assurance and Reliability) and provides a superior review for our NASA leads. R&M is also developing a centralized web-based database that communicates current RSRM issues to the S&MA team in order to improve the communication within the S&MA RSRM team. R&M participated in the SSME Consolidated Audit that was held at Pratt & Whitney (P&W) from September 10-21, 2001. During the audit, R&M primarily participated as a member of the team responsible for reviewing P&W's nonconformance processing for SSME Flight Hardware, flow down of requirements to P&W, and how P&W flows those requirements into procedures and implements them. As a result of the audit, one major and ten minor findings were documented as well as seven areas for process improvement. At the request of SSME Project Office, R&M initiated support to the establishment of an SSME Reliability Board, which is an administrative process for reviewing and gaining SSME Project concurrence of the SSME PRA models. R&M provided ongoing support to the development of the ET upgrades (Friction Stir Weld, B218 Weld Wire, etc.), and participated in a combined PDR/CDR for the upgrades held at MAF.

In support of the International Space Station (ISS) Node 2 and 3, R&M has been extensively updating the Node 2 FMEA/CIL and submitting it to ISS R&M on a subsystem-by-subsystem basis. As part of this update, the Node 2 analysis has been compared to the baselined USL analysis to ensure consistency, previously unanalyzed hardware has been included, and all worksheets are being reviewed and concurred with by appropriate Node 2 subsystem engineers. R&M also coordinated and presented critical items associated with the Node 2 Thermal Control System to the ISS R&M Panel, which is the first step in receiving program approval for these items. In support of Node 3 ECLSS project, R&M completed a draft version of FMEA/CIL worksheets for the Urine Processor Assembly Distillation Assembly (DA) and supported the DA In Process Review. Additionally, R&M continued review and integration of the subcontractor developed FMEA/CIL for the Water Processor Assembly.

In support of the X-38 Deorbit Propulsion System (DPS) design development, R&M completed and released the FMEA/CIL for the MSFC-developed DPS Electrical Interface Panel (EIP) and Bolt Retention System, and supported baselining of these documents by the X-38 CCB. Also, HEI R&M completed the Fault Tree analysis for DPS.

In support of Science & Payloads, R&M participated in the Critical Design Review for the Solar-B Extreme Ultraviolet Imaging Spectrometer (EIS) science instrument. R&M also continued to update the Solar-B FMEA/CIL. R&M completed a reliability prediction for the g-LIMIT project and presented the

results to the project office. The presentation included the assumptions, calculation methodology, results and limitations of the analysis.

4.2.2 Problem Assessment Center (PAC) Operations

HEI's PAC personnel processed and coordinated disposition of problem reports, supported launch preparation milestones, coordinated the MSFC Problem Assessment System, and operated the Corrective Action System (CAS). The PAC received and entered 23 new problem reports (PRs) into MSFC's Problem Reporting and Corrective Action (PRACA) System, coordinated MSFC interim closure of 33 PRs, received 12 prime contractor closure recommendations, supported MSFC full closure of 13 PRs, coordinated non-problem closure of five problems, and performed 343 individual PR database updates and reviews. We conducted nine SSME problem review boards, dispositioning 24 of 24 problem reports presented. The PAC generated or updated trends for all SSME, RSRM, and SRB problems submitted as newly opened or for closure. We have also developed a bubble trend chart technique to display risk based on problem criticality, frequency, and recent problems by projects and subsystems over the last 1 and 5 years.

The PAC supported 11 pre-launch milestones for STS-104, STS-105, and STS-108 in addition to coverage of the Level A countdowns and launch of STS-104 and STS-105. This included providing open problems listing and counts, real-time meeting support, and/or issue analysis on open MSFC PRACA critical problems. In support for the launch attempts, we extracted and provided copies of KSC PRACA problems as they were entered at KSC for MSFC S&MA review during Level A countdown, and instructed the HOSC on use of the KSC PRACA system. We have also extracted and generated a spreadsheet of all countdown problems from STS-72 (1996) through current to help S&MA prepare for common problem evaluation.

In problem system coordination, the PAC conducted three SRB Problem Assessment System (PAS) status reviews for the SRB Chief Engineer, evaluated and facilitated MSFC review of proposed changes to USA-SRB's business procedure BP Q-341, "Preparation and Release of MSFC PAS Reports" and Thiokol's TWR-16461, "Implementation Plan for PAS Reporting", and conducted a survey of RSRM Thiokol's problem processing at their facility. We have also been reviewing and correcting, when necessary, dates and other data in our historic SSME problem data records.

The PAC provided various problem data in support of NASA and MSFC analyses. Special activities included providing SSME problem data on fasteners, the harness system, high pressure fuel pump tip seal damage, and valves and actuators; briefing TD51 representatives on the MSFC PRACA data system and SSME PRACA reports by subsystem; and answering questions regarding MSFC PRACA for the new HEDS Independent Assessment S&MA Coordinator. These were in addition to regular monthly reporting of newly opened/newly closed MSFC PRACA problems and new opened shuttle element PRACA problems for presentation to the Human Exploration and Development of Space; maintaining the PRACA entry on the S&MA RADAR stoplight chart; quarterly generation of the Open Problems List; daily distribution of KSC Shuttle PRACA problems and the report from MSFC's resident office at KSC; daily maintenance of the Open Against Next Mission problem summary available on the web; the new S&MA Daily Report of recent KSC problems, ALERTs, and MSFC PRACA problems open against the next launch; and generation of various ad hoc reports on problem system activity.

In implementation and operation of the MSFC CAS, we received 33 potential CAS reports, screened 32 draft Recurrence Control Action Requests (RCARs), and initiated three new RCARs. We received eight responses from laboratory points of contact with either disposition rationale or response extension requests. We coordinated Corrective Action Board review of eight RCARs, resulting in full closure of seven RCARs. We also provided open RCAR status reports and discussion at the ISO Implementation Team and Focus Team meetings, issued monthly RCAR status and delinquent response reports, and presented monthly metric charts of RCAR activities and statuses at the ISO Implementation Team. We

assisted Customer Satisfaction and Preventive Action presentation preparation for a special MQC meeting, and received no adverse findings as we were surveyed on corrective/preventive action as a part of the NQA surveillance audit and. We obtained DCB approval for revisions to MWI 1280.2, "Customer Feedback" for DCB review and implemented the revised MSFC Customer Feedback Data System (to match revised Form 4306).

4.2.3 ALERT Program

HEI's ALERT support included both regular and special activities as we coordinated MSFC ALERT processing. HEI received and distributed 26 ALERT announcements for MSFC review and obtained 434 responses from MSFC project, contractor, and laboratory contacts. One of these was a special OIG release, two were coordinated with S&MA for quick release during the STS-105 mission freeze, and one was MSFC-initiated. We continued instruction and clarification on MSFC ALERT processing to various individuals and small groups, including ED, ASRI, and Cortez III in a requested meeting. We participated in GIDEP's Industry Advisory Group Steering Council and drafted an abstract relating GIDEP and ISO requirements for presentation at the May 2002 GIDEP workshop. We also queried the GIDEP database in support of Industrial Safety for information regarding fall protection devices.

4.3 QUALITY (QE)

Space Transportation

ET Quality Engineering (QE) assisted in the preparation of PAR presentation material for the ET-117 othogrid crack investigation. ET QE also participated in a combined PDR/CDR for the Al 2219 aft ogive and Al 2297 thrust panels and a CDR for ET friction stir welding and Al B218 weld wire. QE generated three RCAs in conjunction with the combined PDR/CDR for the Al 2219 aft ogive and Al 2297 thrust panels. QE also participated in qualification activities associated with the composite GH2 pressline fairing, including witness of hot gas testing at the MSFC Material and Environments Test Complex.

SRB QE continued work on the Booster Separation Motor (BSM) Cracked Insert Anomaly, BSM Unburned Propellant Anomaly Resolution, and Chemical Systems Division (CSD) Phase II Review Teams. In addition, QE participated in the Auxiliary Power Unit Gas Generator Injector Stem Anomaly. QE conducted reviews and analysis of Certificates of Qualification, Process Procedures, Engineering Changes, and Nonconformances for the SRB Project. HEI also participated in a Phase 3 Review of CDF assemblies at the manufacturers facility in Fairfield, CA.

SSME QE provided support for pre-test planning sessions, post-test data reviews, and acceptance reviews associated with acceptance of flight engine assemblies and related components. QE on team 1B, participated in the Consolidated Audit at P&W from September 17 – September 21,2001, resulting in a number of findings and Opportunities for Improvement. QE provided direct support to the PSIG Subcommittee working the STS-104 IFA. In addition, QE reviewed block II test data and assisted in developing models used to predict engine flight characteristics.

QE participated in the closure of the X-38 project MRB Pyrotechnic Separator Assembly nonconformance so they would be certified for use in the Electrical Interface Panel (EIP) qualification testing. Thermal and vibration test procedures for the qualification testing of the EIP were reviewed/evaluated. QE also reviewed the thermal and vibration test procedures for the development testing of the Bolt Retraction System.

Software Quality Assurance (SQA)

HEI SQA prepared documentation, scheduled and witnessed an SQA audit of MSRR-1 Software Problem Reporting and Corrective Action. SQA also reviewed and provided comments for the MSRR-1 Enhanced Master Controller Requirements and Detailed Software Design Specification documents. SQA comments were incorporated into the internal ED14 baseline. SQA also supported the SOLAR-B / EIS CDR. In

addition, SQA supported the Flight Software Group ED14 by participating in the Capability Maturity Model Level III pre-assessment and MSRR-1 Software Review Board.

ISO

QE efforts have dealt with implementation of the ISO 9001:2000 revision, training, maintenance of documentation, internal quality audits, and support for the recent registrar surveillance and pre-assessment audits, including closure of corrective actions. Customized ISO 9001:2000 training for various organizations was provided, as well as documentation reviews and consulting support. QE revised the Marshall Management Manual to incorporate the ISO 9001:2000 revision requirements. Consulting support on continual improvement, customer satisfaction, and process performance and product conformity was provided to teams that are addressing those issues. QE contributed to general training content for the ISO 9001:2000 transition, continual improvement, and customer satisfaction, as well as provided updates of information on the MSFC ISO 9000 web page.

QE has supported SD40 with the implementation of ISO-9000/2000 by leading a four-day internal three-man audit team in the assessment of SD40 groups, documenting findings and presenting results and recommendations for improvement to the SD40 management team. In addition the QE has written an SD40 ISO Compliance Organizational Work Instruction which is in the draft approval stages. A matrix of ISO requirements and corresponding MSFC documents was developed for use in training and simplifying requirements. QE also developed ISO-9000/2000 subset requirements matrix and organizational functions for SD40 Management to use as an accountability assignment and training tool.

Payloads

QE participated in an FRR for the DCPCG project. The review was to insure the readiness of the DCPCG payload for shipment to the launch site and flight on ascent ISS Flight STS-105 (7A.1) and descent ISS Flight STS-108 (UF-1). QE also provided input to the S&MA action items from the IRR for the FRR review and revised the DCPCG Quality Plan. In addition, HEI Quality participated in the Solar B EIS CDR.

Payloads QE participated in a two-day continuous risk management training class and workshop to develop the risk database for MDMG.

QE supported a Solar-B project CDR meeting at BF Goodrich in Danbury, Connecticut. The purpose of the meeting was to perform a documentation review of the X-Ray Telescope Optics for the Solar-B instrument. QE also supported the Solar-B project by attending a project review meeting with SAO in Boston, Massachusetts. Several issues were discussed concerning SAO's XRT Product Assurance Plan such as Contamination Control, Materials and Processes Selection and Control, Quality Assurance location in the SAO Organization, and Material Review Board Authority.

QE supported and coordinated a review of the Microgravity Science Glovebox (MSG) Engineering Unit (EU) Acceptance Data Package (ADP). The ADP accompanied the MSG EU from the European Space Agency and the review consisted of examining the ADP for compliance to MSFC requirements.

QE witnessed the Stanford University Mission Operations Center (MOC) Simulation 2B for Gravity Probe B (GP-B) at Palo Alto. Also during this visit, Quality Engineering reviewed 2 volumes of historical records and procedures for the GP-B payload for compliance to MSFC requirements. QE also participated in a TIM at Moog in Buffalo, NY. The purpose of the TIM was to exchange technical information with Moog as the GP-B program pursues alternate sources for a Gas Management Assembly. HEI Project Assurance for GPB supported the MSFC Failure Investigation Team as a result of contamination during a hardware move.

Inspection and Test
HEI quality assurance provided expertise in all MSFC test areas to MSFC test engineers and contract support personnel. The plasma arc facility, X-33 hydrogen test facility, X-38 test facility, TS 116, TS 300, TS 500, and the hot gas test facility are examples of test areas supported by quality assurance. Test procedures and planning were reviewed to ensure proper quality and test requirements are met on a day-to-day basis. HEI Quality Assurance performed receiving inspection and witnessed assembly and testing for PCG, g-LIMIT, PCAM, VCD, ProSEDS, MSRR, X-37, X-38, SUBSA, PCAM, and OGS. A trip to KSC in support of testing of VCD was successfully accomplished. X-38 DPS test plans and procedures were evaluated and testing was witnessed.

4.4 Information Management (IM)

During the quarter, Information Management's (IM) most significant contributions included application development supporting QS30 and MSFC's VPP STAR certification efforts. IM incorporated major revisions in the Inventory of Hazardous Operation (IHOPs) application due to requirements changes. The application will be deployed on October 16, 2001. IM also developed a Checklist database and functionality for completing the checklists through the Supervisor Safety Web Page (SSWP) application. IM also developed input forms to enable data owners to control the continued development and maintenance of the checklists. IM developed a web page displaying printable copies of the checklists that automatically update from the database. The checklist functionality will assist in MSFC's STAR certification readiness. IM revised the Safety Concerns Reporting System (SCRS) application to reflect a four-zone Safety Representative system and to provide a "reject" function. Safety Search was revised to add a search by the Safety Zone representative and to add information about items closed in the past sixty days within numerous related applications. SSWP was revised to improve the operating speed for large contractor organizations, to provide a top-level report for viewing findings, and to incorporate other user requests. Three mishap-reporting applications were revised to populate from a central database, reducing duplicative entry. Special requirements supporting hazardous operations were incorporated into Haztrak functionality. In addition, the application that allows personnel to sign up for Safety training classes was revised to allow Training personnel to control some input and update, and to provide automatic notification when maximum attendance is reached.

Other development efforts supported improvements in the Marshall Management System (MMS) and improved IM operations. The Quality Comment (QualComm) application was replaced by the Customer Feedback application to support MMS changes; revisions were incorporated to support an upcoming audit. In addition, IM completed search functionality enhancements for the Discrepancy Report (DR), Recurrence Control Action Report (RCAR) and Quality System Discrepancy Notice (QSDN) applications. IM also developed and deployed the Information Management Support Request (IMSR) application for use by the S&MA community in requesting support for IM activities, and for providing feedback regarding support received. Use of IMSR by S&MA personnel will allow control, prioritization and review of IM activities.

Other IM activities included support of the QS organization's IT Security Training initiative and Section 508 compliance efforts. IM assisted QS personnel in resolving password, database, access and software incompatibility problems and in training 100% of personnel in IT Security. In support of Section 508 compliance, IM evaluated various compliance analysis tools, procured the chosen tool, and evaluated all web-deployed applications and web sites. The applications were prioritized for retrofit and a schedule was incorporated into a plan that was submitted to the Center's Information Services Department for compilation into MSFC's retrofit plan.

4.5 Human Exploration and Development of Space (HEDS) Assurance

The Human Exploration and Development of Space (HEDS) Independent Assurance (IA) Team continued formal assessment work and evaluations of Shuttle and International Space Station (ISS) areas of risk and significant events, provided key participation in the HEDS IA Integrated ISS/STS Assessment Teams, participated in other ISS and Shuttle Program meetings and special teams, researched and updated HEDS IA risk items, and followed up on past findings for closure. In addition to evaluations and formal assessments, HEDS IA engineers have continued to deliver numerous Engineering Information Reports (EIRs) in response to action items and short notice requests for information by the HEDS IA Office.

4.5.1 International Space Station (ISS) Independent Assessment

ISS assessment and evaluation topics include: (1) X-38 Deorbit Propulsion Stage progress, (2) Common Berthing Mechanism (CBM) and Space Station Remote Manipulator System (SSRMS) loads testing, (3) Italian Space Agency Habitation Module (IHAB) requirements, (4) ECLSS Carbon Dioxide Removal Assembly (CDRA) and Major Constituent Analyzer (MCA) on-orbit operation and maintenance, and (5) Internal Thermal Control System (ITCS) water chemistry anomalies. Additional topics have been briefed to the HEDS IA Office as potential assessments.

4.5.2 Space Shuttle Independent Assessment

Shuttle topics include: (1) the United Space Alliance KSC quality process surveillance system; (2) SSME Advanced Health Management System Phase I upgrade; (3) Helium Auxiliary Power Unit System Requirements Review; and (4) Thiokol Wasatch Facility quality program issues. Final observations and recommendations from assessments were forwarded to the appropriate program personnel. Additionally, personnel participated with JSC HEDS IA personnel in a team assessment, "Evaluation of Space Shuttle Upgrades and Priorities."

4.6 Project Assurance

HEI Project Assurance (PA) personnel provided technical support and assessments of Space Shuttle flight readiness for Pre-launch Assessment S&MA reviews for STS-104 and STS-105. HEI also provided support at the HOSC during the launch of STS-104 and STS-105, during the reporting period. PA supported the Safety Integration console from "Level A" through main engine cutoff. No major issues on the MSFC elements were worked during the countdown. Launch occurred on the first attempt of STS-104 and on the second attempt for STS-105. The first launch attempt was scrubbed due to lightening near the Cape. HEI personnel provided project assurance support for the ET, SRB and RSRM S&MA Assurance Offices.

In support of the Space Shuttle S&MA Integration Office, the following tasks were performed: PA coordinated MSFC S&MA participation in three Space Shuttle System Safety Review Panel Teleconferences, downloading presentation materials and providing copies for local participants. PA also reviewed the KSC Launch and Landing Critical Items List (CIL) waivers and Hazard Report (HR) updates and JSC Government Furnished Equipment (GFE) HR and CIL updates and changes.

PA supported the Shuttle Environmental Assurance Initiative (SEA) by attending monthly teleconferences and providing risk management expertise to the working group. PA recommended changes in the way the SEA Steering Group proposed to maintain and present risk evaluation data sheets including streamlining the change approval process. PA also supported and prepared charts for the monthly HEDS telecon with the HEDS Enterprise Centers S&MA Directors.

The HEI PA Space Shuttle Transition specialist worked during this period to find models where government functions performed by civil service personnel had been turned over to contractors and the civil service personnel were rebadged as contractors. PA was able to find several examples of how this has been done in the past and this information was passed on to the Space Shuttle S&MA Integration Office.

PA element leads participated in numerous project activities including RSRM FSM-9 test review, pyrotechnic phase reviews and Kaizen team support. SSME PA worked with P&W auditors in planning and successful execution of the SSME Consolidate Audit held at Pratt and Whitney in September. PA also participated in the Postflight Assessment of STS-104 SRB/RSRM hardware at Hanger AF in Cape Canaveral.

HEI Project Assurance (PA) personnel provided support to the Space Launch Initiative (SLI) phase I initial contractor program reviews for Lockheed Martin, Boeing, and Northrop Grumman. The three meetings were supported along with side meeting discussing the connections between risk management, safety and reliability, and a side meeting discussing the scope of the safety assessments for the Crew Return Vehicle (CRV).

4.7 Risk Management and Risk Assessment

4.7.1 Risk Management

During this period, five additional HEI support staff were trained as Continuous Risk Management (CRM) instructors. Four of those trained have taught the course and are now fully certified to teach CRM. The fifth instructor will be trained at a future class. In this period, HEI has taught the CRM course to two MSFC projects.

4.7.2 Space Shuttle Probabilistic Risk Assessment (PRA)

During this reporting period, Risk Assessment (RA) continued to work on the Space Shuttle Probabilistic Risk Assessment (PRA) project. MSFC PRA team members (HEI and the prime contractors) attended a Shuttle PRA Technical Interchange Meeting at JSC to discuss the modeling status, SAPHIRE Software, and general modeling procedures. The RA PRA team members also made another round of trips to the Prime Contractors to discuss individual PRA models and how to incorporate human/process errors. RA has assisted the primes in developing their models, reviewed completed models, and done much of the input of models into the SAPHIRE software. For the Phase I SAPHIRE PRA Integration test, RA team members reviewed and trimmed the PRA models down to the failure mode levels per direction from the PRA Technical Lead. The models were submitted to JSC PRA Team for integration test at the end of this quarter.

4.7.3 Reliability Prediction & Risk Assessment

HEI RA has supported the SRB project office and USA in evaluating sampling plans for thickness measurements of MCC-1 (Marshall Convergent Coating) TPS (Thermal Protection System). RA is recommending a statistical process control approach to make this a more effective screen than before and developed a novel statistical procedure to examine the complex quality data. In addition to improved process insight, the recommended sampling plan greatly reduces sample sizes from their current levels. RA assisted the team addressing SRB Independent Operations Assessment Team (IOAT) Action Item #10, involved with reduction in problem reports (PR's). RA assessed the excellent PR database and made improvement recommendations in summary charting, key problem identification and prioritization. RA presented the PR recommendations to the SRB project and to USA's board responsible for PR activities. RA continues to support the RSRM pocketing erosion Unexpected or Unexplained Event or Condition (UUEC) team by supporting statistical analysis of relevant data. This has included uncovering trends in manufacturing indicating a change in a key process and assessing limits to the phenomenon suggested by test data.

5.0 COST REDUCTION ITEMS

Our continuing cross-utilization of employees, continuous analysis of work in progress to assure that application of resources meets the needs of the task, and the judicial acquisition and distribution of tools to enhance the efficiency of all team members allow us to minimize cost to the customer.